Southeast Alaska

Cloudburst Chronicle

NOAA's National Weather Service
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Coast Guard vessel at the entrance of the Columbia River in Oregon (photo credit: Mariners Weather Log)

In this issue:

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NOAA Employee of the Month

By Tracey Lake

February's NOAA Employee of the Month is our very own Chris Maier, Warning Coordination Meteorologist (WCM) for the Juneau Weather Forecast Office. As the WCM, he is responsible for conducting and managing outreach with customers and partners, and making sure that the warning program services provided by his office meets our customers' needs. In addition to those duties, he also fills in as the acting meteorologist in charge or on a shift when needed. It is necessary for Maier to keep up to speed on what is happening in his office, have a hand in the operations, and keep abreast of office teams.

"What I enjoy most about this job is getting out and talking with customers and partners," Maier says. "I can help them understand the weather and what our mission is all about."

For example, Maier was one of a group of individuals to travel to Prince of Wales Island to conduct tsunami outreach and education for a week in September 2004. "It was a great experience going to each school and community, educating them on the hazards of tsunamis and informing them about TsunamiReady. When you get the chance to interact with the kids, that's what it's all about."

But that's not the only job that Maier has – he's also a

U. Jones

WCM, Chris Maier

National Weather Service Incident Meteorologist (IMET). The IMETs are a cadre of highly trained fire weather forecasters that are sent to remote locations throughout the U.S. to support wildfire operations.

Maier got into the IMET program in Salt Lake City while working as the fire program leader. The development of this leadership position required him to be IMET certified. He's been on site at numerous fires, and had a few assignments working at state and regional command centers. The duties at the command centers involve simultaneously keeping track of and supporting numerous fires, not just one.

Maier has also received training in oil spill response, which made him the perfect choice as the first IMET on site for the recovery and clean-up operations for the M/V Selendang Ayu, whose grounding and subsequent oil spill near Unalaska

Island in the Aleutian Island chain created a major environmental crisis. He volunteered without hesitation to deploy on very short notice to this extremely remote location and displayed great organizational skills, flexibility, and patience in making the long journey to the Joint Command Center in Dutch Harbor. Less than 72 hours after the incident, he arrived on scene and immediately began working with the Unified Command and his NOAA team members in National Ocean Service's Office of Response and Recovery (NOS ORR) to evaluate their capabilities for providing scientific and safety support. Just a few hours later, he began communicating these needs to his colleagues at Weather Forecast Office (WFO) Anchorage and Alaska Region Headquarters.

"Having never worked on an oil spill incident, the hardest part was understanding the operational needs of the team and forecasting effectively to meet those needs," said Maier. "I had the support of the folks in the Anchorage forecast office to provide me with the products and information I needed to do my job. In a lot of ways an IMET is only as good as the support they get from the local office, and Anchorage went above and beyond the call of duty to provide that support."

The weather conditions were a critical factor during the response to this incident, often grounding air and marine support operations and creating dangerous conditions for responders. Maier was successful in forecasting windows of opportunity (lulls in the weather) when the team could safely operate, and mission critical decisions made by the Unified Command regarding operations and resource planning were based upon his forecasts.

At a time when the National Weather Service (NWS) IMET program is under review in terms of expanding into "all hazards" support, Maier has made a major contribution toward that end. His critical role in the Selendang Ayu incident provides clear justification for this effort, and his experiences will provide NWS decision makers with timely and pertinent information to consider.

"Chris Maier's tireless dedication to customer service and exceptional professionalism make him well deserving of the NOAA Employee of the Month award," said Tom Ainsworth, Meteorologist in Charge of the WFO Juneau. "His years of experience working in the Incident Command System and his weather forecasting accuracy quickly earn Chris respect from everyone he serves with on these interagency response teams. Chris has a knack for delivering the exact environmental information needed by our customers to maximize their safety while carrying out precision air and ground operations. Chris' performance, day in and day out, reflects great pride on our organization."

"I think it's a real honor to be recognized in such a manner, but I want to emphasize that this was a team effort," says Maier. "I couldn't have done my job without the support of other NWS staff, and the work of the individuals in the NOAA Hazmat office [NOS, ORR]."

The role of a NWS IMET is in itself above and beyond the standard call of duty for a meteorologist. Each day our highly trained IMETs make great sacrifices. Maier believes the biggest sacrifice that an IMET makes is being able to respond immediately, to leave their family at the drop of a hat. He left for the Selendang Ayu incident on December 10, 2004 and was due to be relieved a few days before Christmas. As it turned out, the IMET traveling to take over the duties in Dutch Harbor was delayed due to weather and didn't arrive until the morning of Christmas Eve. Maier traveled that day to make it home in time to be with his wife Virginia and to enjoy his daughter Zelly's first Christmas.

U.S. Fish & Wildlife

M/V Selendang Ayu

A Snowy Time in Southeast Alaska

By Bob Tschantz

A considerable amount of snow fell over much of Southeast Alaska from mid-January through mid-February. During the period of January 13th through February 13th, snowfall at the Juneau airport was nearly 3 feet above average! Since then, several outbreaks of cold air have occurred and southwest flow aloft brought in moist air from the Gulf of Alaska and Pacific Ocean, overrunning this cold air to produce snow. While there were warmer periods in between these colder air outbreaks, they were generally short-lived, lasting only a few days for the most part. Some snow events had temperatures near freezing for the entire event, and these events often produced heavy snowfall, especially over southern Southeast Alaska. Some of the more notable snowstorms were around the 16th to the 19th of January over northern Southeast Alaska, where more than 30" of snow fell in many areas, and the 9th through the 12th of February over southern Southeast Alaska, where more then 3 feet of snow fell over the interior valleys. Here is the total snowfall for a few selected stations since the snowy period began mid-January through February 13th:

Station	Snowfall
Annex Creek	122.3"
Hyder	95.6"
Snettisham	92.8"
Canyon Island	92.6"
Juneau Forecast Office	76.4"
Juneau Lena Point	65.4"
Juneau Airport	60.0"
Haines Downtown	54.0"
Gustavus	51.8"
Haines Customs Station	45.3"
Pelican	39.3"
Juneau Downtown	26.7"
Petersburg	22.4"
Blashke Island	13.0"

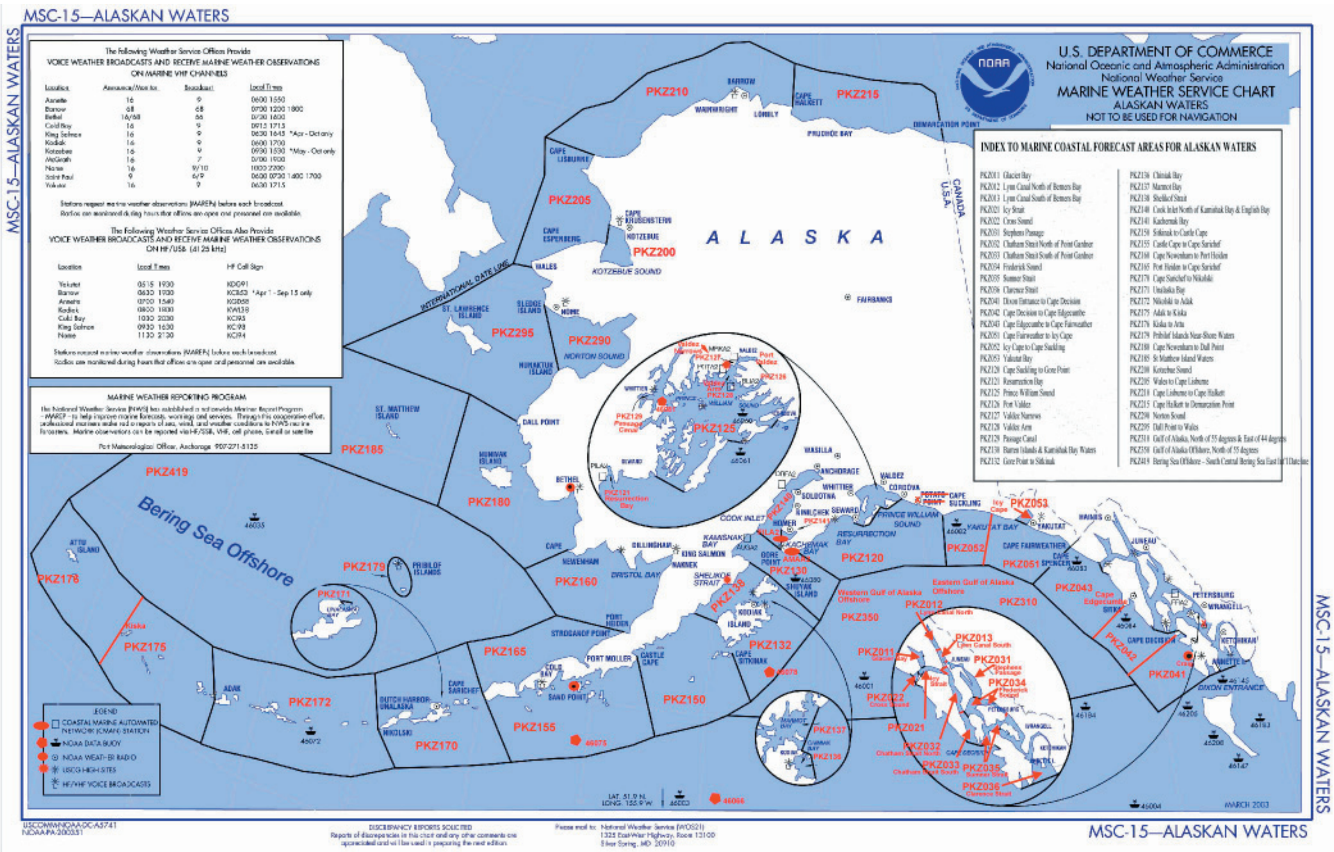
U. Jones

Local weather station at WFO Juneau

Thanks to all of our Cooperative Observers for their daily reports! Keep those reports coming.

U. Jones

WFO Juneau January 18th



An updated Marine Weather Service Chart for Alaskan Waters should be available by June. Mariner's can receive copies by contacting their local NOAA Weather Service Office. A draft of the new chart is depicted here.

ATTENTION MARINERS! UPDATED MARINE WEATHER SERVICE CHARTS FOR ALASKAN WATERS (MSC-15) COMING SOON!

By Chris Maier

Tired of hearing all the relatively new marine forecast zones being referenced on NOAA Weather Radio and not quite sure where they are? Sick of attempting to train inexperienced crew (or even just your kids!) about the marine weather forecast system with outdated charts? Still confused by how the new marine zone numbers relate to the now defunct "marine areas"? Help is on the way! The MSC-15 has been updated and should be available by June.

In Southeast Alaska, these charts will be available at the NOAA Weather Service Offices in Juneau, Annette, and Yakutat. Another convenient way you will be able to grab a copy is by stopping at your local Harbor Master's Office. We'll be shipping boat loads of them out to the Harbor Masters in Southeast Alaska. We will also do our best to ensure all our major marine partners (from the United States Coast Guard to the Alaska Marine Highway System), as well as our major customers (from the tugs to the fishing fleets) are mailed copies.

Electronic versions of all 16 NOAA Marine Weather Service Charts for U.S. coastal waters are available at http://www.nws.noaa.gov/om/marine/pub.htm. Every year the Federal Aviation Administration/National Aeronautical Charting Office in Greenbelt, Maryland updates 2 of the 16 NOAA charts. Due to the extensive changes in our marine forecast program, we worked hard to have the Alaska chart updated now, rather than the scheduled 2008 date. Thanks to the folks at NOAA's National Weather Service Headquarters and the FAA cartographers, we were able to pull that off! Please watch the top news section of our web site, pajk.arh.noaa.gov, to see when the new charts arrive and for additional ways to get your copy.

Welcome to the Staff

By Brian Bezenek

Last July, Kerry Hanko arrived in Juneau to take up her duties as a member our forecast staff. Here is a little bit about our newest forecaster.

***Brian** – "Where are you from?"*
***Kerry** – "I am from Oak Park, Illinois, a suburb on the west side of Chicago."*

***Brian** – "Have you always been interested in weather?"*
***Kerry** - "Yes. From the first time I saw the tornado scene in The Wizard of Oz I had an interest in the weather. Often times while growing up, my father and I would run out to the front porch when the National Weather Service issued a Severe Thunderstorm or Tornado Watch, hoping to get a glimpse of the thunderstorms moving into the area. I think I first considered a career in meteorology after spending hours watching The Weather Channel's live coverage of Hurricane Andrew striking Florida back in 1992."*

"I like being a forecaster because weather affects the lives of everyone, everyday."

***Brian** – "Where did you receive your meteorological training?"*
***Kerry** – "I received my Bachelor's Degree in Meteorology from Northland College, which is a small, private school on the banks of Lake Superior in northern Wisconsin. Northland specializes in environmental sciences."*

***Brian** – "Where else have you worked?"*
***Kerry** – "I worked at a private forecasting company in Oklahoma City for just over 2 years. There we created specialized forecasts for clients such as energy and transportation companies, ski resorts, and the media. Often times, my area of forecast responsibility would span the globe."*

***Brian** – "What do you like best about being a forecaster?"*
***Kerry** – "I like being a forecaster because weather affects the lives of everyone, everyday. It's often one of the first things people think of when they wake up in the morning; it affects our daily plans and our future plans. It can be deadly at times, too, and I like the idea of potentially saving lives. The weather is always changing and there will always be something new to learn about it."*

***Brian** – "How long have you been forecasting the weather?"*
***Kerry** – "My first weather forecasts outside of the classroom were for the college newspaper and weather hot line back in 1999. I spent some volunteer time working at the National Weather Service in Duluth, Minnesota, as well as with a few television stations in Duluth. My first official job working in the field of weather began in January 2002, after I graduated college."*

***Brian** – "Why did you choose to accept a job in Alaska?"*
***Kerry** – "I applied for the internship in Juneau for several reasons. Most important of all was finding a location that both myself and my husband could agree upon. After spending two summers in Oklahoma, we decided that the 100 plus degree heat did not suit us. We also missed the snowy Midwestern winters. Finally, we wanted to find a place that was beautiful, where we could enjoy the outdoors in all seasons. Juneau just seemed the perfect fit for us. I had always wanted to visit the area. Ironically enough, we nearly booked a cruise to Southeast Alaska for our honeymoon before I applied for the job."*

***Brian** – "How do you like Alaska so far?"*
***Kerry** – "So far, I love it here! It is by far the most beautiful place I have visited and I can't wait to see more of it! The wet weather and short days of winter are taking some getting used to, but I really have not minded it at all. I certainly hope to stay here for a while."*

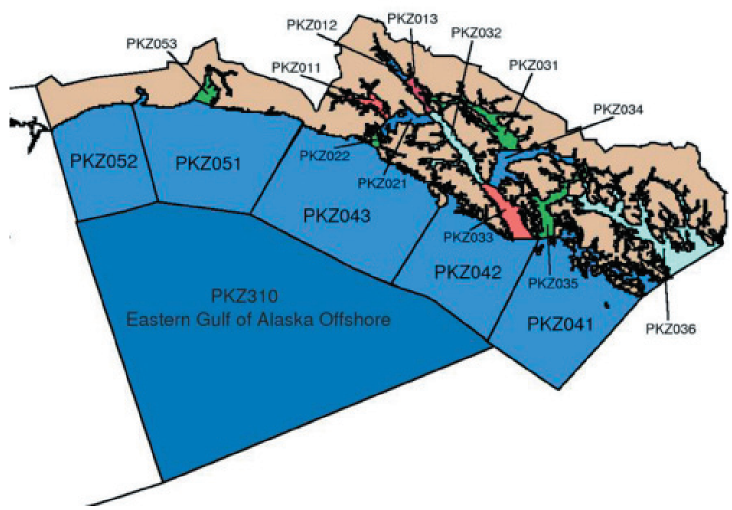
***Brian** – "Kerry, thanks for answering our questions and welcome to Juneau."*

Tornado, 7 miles south of Anadarko, Oklahoma 1999

When Do Ocean Waves Become 'Significant'? - A closer look at wave forecasts
By Tom Ainsworth

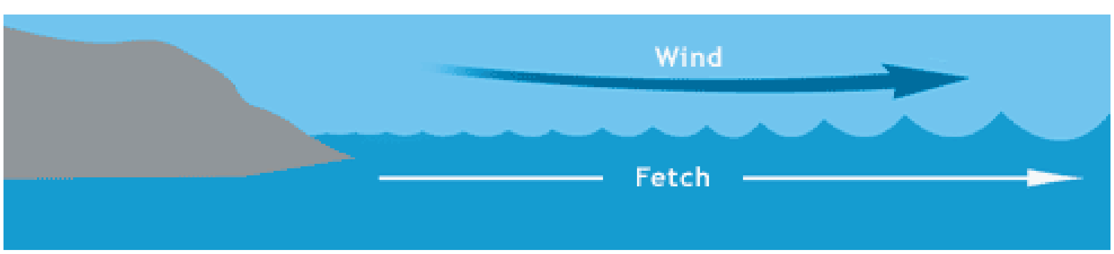
Anyone who has spent time on a boat can probably recall an encounter with significant waves. Of course, the size of wave someone might consider to be "significant" is very subjective and dependent on the size of the vessel that person's encounter took place on. When my family and I moved to Juneau, we sailed on the 408-foot Alaska State Ferry *Matanuska* from Bellingham, Washington. The ship rolled through seas I estimated to be, on average, 15 feet high while crossing Queen Charlotte Sound on a Saturday afternoon with a west wind approaching gale force. We were in the movie lounge on the 4th deck watching a video donated by a passenger when, out of the blue, the port side windows were slammed by a drenching wave. As the water poured off the deck and back into the Sound, my wife and I exchanged silent glances. Our seats were at least 25 feet above the waterline. Not long before this power-washing wave hit, people were outside our window gripping the rail and squinting with awe into the wind that required a forward lean and wide stance to maneuver through. In my book, that solitary wave into the side of the 4th deck of the *Matanuska* was certainly a significant one. But the term "significant wave height" has a specific definition and anyone using marine weather information should have a clear understanding of what it means.

NOAA's National Weather Service Forecast Office (WFO) in Juneau is responsible for informing citizens about weather conditions over a 150,000 square mile area that includes the eastern half of the Gulf of Alaska and the entire Alaska Panhandle. More than half of our forecast area is over water. Mariners on Southeast Alaska waters comprise a large percentage of our audience and seek out weather information daily. This diverse audience is comprised of weekend recreational boaters, commercial fishers, and large passenger ships. WFO Juneau's marine weather forecasts include information about prevailing wind speed and direction and significant wave height. As we head toward the warmer months of the year, when Southeast Alaska waters become more populated, let's review basic ocean wave characteristics so mariners can interpret marine weather forecasts as NWS forecasters intended.



WFO Juneau's area of responsibility

<u>Wave Formation:</u> Waves are formed by wind blowing along the water's surface. Wave height is dependent on wind speed, fetch length, and duration of time the wind blows consistently over the fetch.



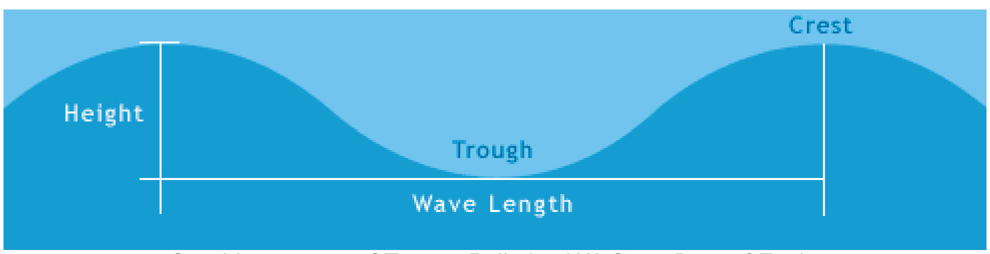
Graphic courtesy of Tammy Pelletier, WA State Dept of Ecology

Wind 'fetch' is the distance the wind blows over water with similar speed and direction. Higher wind speeds blowing for long periods of time over longer stretches of water result in the highest waves. Waves that are the direct result of the local wind are called ‘wind waves’. Wind waves are short, choppy, and tend to break (white cap) when winds reach about 12 knots. These are the most common waves on lakes, ponds, and in the confined, narrow stretches of Southeast Alaska’s inner channels.

Wave pattern considerations become more complex in the open ocean and Gulf of Alaska. Waves are still formed by the local wind, but once formed, ocean waves can travel for thousands of miles. Waves that travel outside of their generation area and are no longer the result of the local wind are called ‘swell’. Compared to wind waves, swell have smoother crests. Over time, swell “packets” or “groups” travel great distances, converge with other waves caused by distant storms and traveling in different directions, and refract off coastlines. Therefore, ocean surfaces are comprised of thousands of interacting waves, originating from different places and traveling in different directions at different speeds. This is known as a ‘wave spectrum’; a combination of waves with different heights, frequencies, and direction of movement.

In Southeast Alaska, the wave spectrum, or range of wave heights, is different in the inner channels than it is in the open Gulf. The inner channels are dominated by wind waves and, except for near entrances to the open ocean, experience fewer swell. The open Gulf contains a broader range of wave heights.

Wave Dimensions: The magnitude of a wave is determined by three components: height, length, and period (or frequency). A fourth wave component is steepness. Wave height is the distance measured from the trough to the crest of the wave. Wave length is the distance between successive crests (or troughs). Wave period is the time that elapses between the passing of

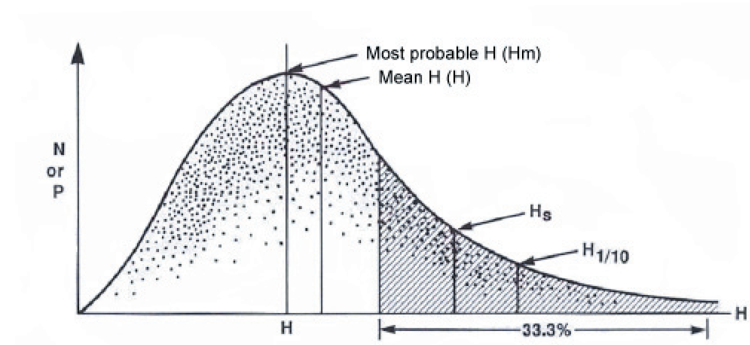


Graphic courtesy of Tammy Pelletier, WA State Dept of Ecology

successive crests (or troughs). Wind waves tend to have smaller heights and shorter periods than swell. Wave steepness is the slope determined by the ratio between wave height and wave length. When wind wave heights and periods are close to the same value (e.g., six foot seas every six seconds), wave steepness is severe and pitch poling becomes a real possibility for smaller vessels as does capsizing in beam seas. The farther waves move away from their source region, their wave length and period gradually increase. Therefore, waves with long periods, greater than 10 or 12 seconds, are arriving from a distant source and are considered swell.

Significant Wave Height: By now you know a wave spectrum is an extremely complex fluid phenomenon. The spectrum is literally made up of waves on top of waves (on top of waves!). It is extremely important for mariners to understand how this spectrum of wave heights is conveyed in marine weather information. The wave height value in a forecast and reported by ships and buoys is called the significant wave height. Significant wave height (Hs) is defined as the average height of the highest one-third waves in a wave spectrum. This happens to correlate very well with the wave height a skilled observer perceives in a wave spectrum.

What do we mean by "highest one-third waves"? Remember, a wavy water surface is comprised of thousands of interacting waves that originated in different places and traveled in different directions at different speeds. If a person could filter out and plot on a graph all of the waves that make up a spectrum, the distribution of waves with different heights would result in a "bell curve" graph similar to the one in the figure to the right. Each dot represents the number of waves (N) in the spectrum with a height of H. The graph shows there are a relatively low number of small waves (left side of graph) and a low number of very large waves (right side of graph). The greatest number of waves (N) in this spectrum fall in the mid range of heights (centered under Hm). The highest one-third (33.3%) number of waves in this spectrum are shaded on the graph. The average height of waves in this shaded group is the significant wave height, Hs.



The statistical distribution of wave heights showing various parameters (from Bretschneider, 1964)

Also shown are the mean wave height (H), most probable wave height (Hm), and the height of the highest 10% of waves (H1/10). The mean wave height H is approximately equal to 2/3rds (0.64) the value of Hs and H1/10 is approximately equal to 1.27 times the value of Hs. In addition, the height of the highest 1% of waves (H1/100) is approximately equal to 1.67 times Hs, and a theoretical maximum wave height (Hmax) is approximately equal to two times Hs.

Quiz Time! Let's take a minute and put all these wave heights we have learned about into perspective by practicing how to derive pertinent wave characteristics. If you read a marine weather forecast predicting "SEAS 10 FT", what is really being conveyed in that forecast?

- Hs = 10 ft
- H (mean) = (0.64)Hs = 6.4 ft
- H (most probable) = 6 ft
- H1/10 (10% highest waves) = (1.27)Hs = 12.7 ft
- H1/100 (1% highest waves) = (1.67)Hs = 16.7 ft
- Hmax (highest wave you should be on the alert for) = 20 ft!

Mariners should know the physical limits of their vessels – both wind speed limits and wave height limits. The marine weather forecasts provide both wind velocity (speed and direction) and wave height information. Wave height values, both predicted and observed, are defined as the significant wave height, denoted as Hs. Hs is not a single value by any means but rather a value which represents a range of heights occurring in a wave spectrum from approximately 60% of Hs to 200% of Hs! This range is somewhat narrower in our inner channels where the contribution of ocean swell is less. Mariners are asked to not focus on the single significant wave value in a forecast or observation but to recognize the concept of the wave spectrum. Mariners can reduce their risk of encountering bigger than expected waves by understanding the range of wave heights in a spectrum defined by a particular significant wave height. As for the wave that crashed into the 4th deck of the *Matanuska* ferry some years ago, now you know it was well within the range of waves expected in that spectrum (and not even Hmax). That glance I gave my wife when it happened was an unspoken, "I told you we could get wet."

NORTH AMERICAN COUNTRIES REACH CONSENSUS ON EL NIÑO DEFINITION

By NOAA Public Affairs

NOAA, the National Oceanic and Atmospheric Administration, announced in early February that its National Weather Service, the Meteorological Service of Canada, and the National Meteorological Service of Mexico had reached a consensus on an index and definitions for El Niño and La Niña events (also referred to as the El Niño Southern Oscillation - ENSO). Canada, Mexico, and the United States all experience impacts from El Niño and La Niña.

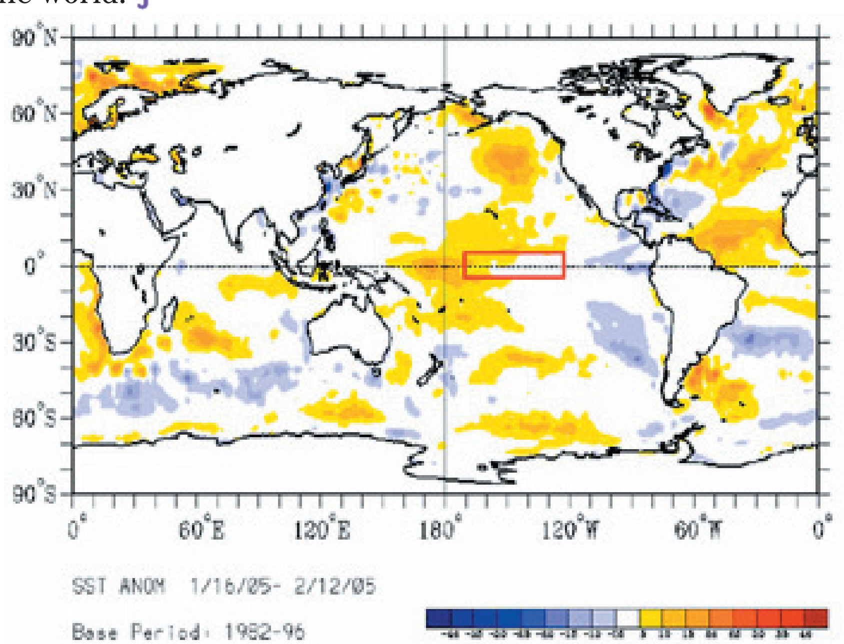
“Three nations, on the same continent, agreeing on the index and definitions for such a significant climate feature as El Niño and La Niña goes a long way to aid NOAA in its mission to understand climate variability as well as make climate forecasts in order to protect, restore, and manage in light of ENSO related-events and impacts,” said retired Navy Vice Admiral Conrad Lautenbacher, Ph.D., Under Secretary of Commerce for Oceans and Atmosphere and NOAA Administrator.

“The agreement on the index and definitions for North America is a major milestone in climate monitoring,” said Brig. Gen. David L. Johnson, U.S. Air Force (Ret.), Director of NOAA’s National Weather Service. “Having the same operational definitions helps to ensure consistency and further coordination in climate assessments issued by the North American meteorological services.”
North America’s operational definitions for El Niño and La Niña, based on the index, are:

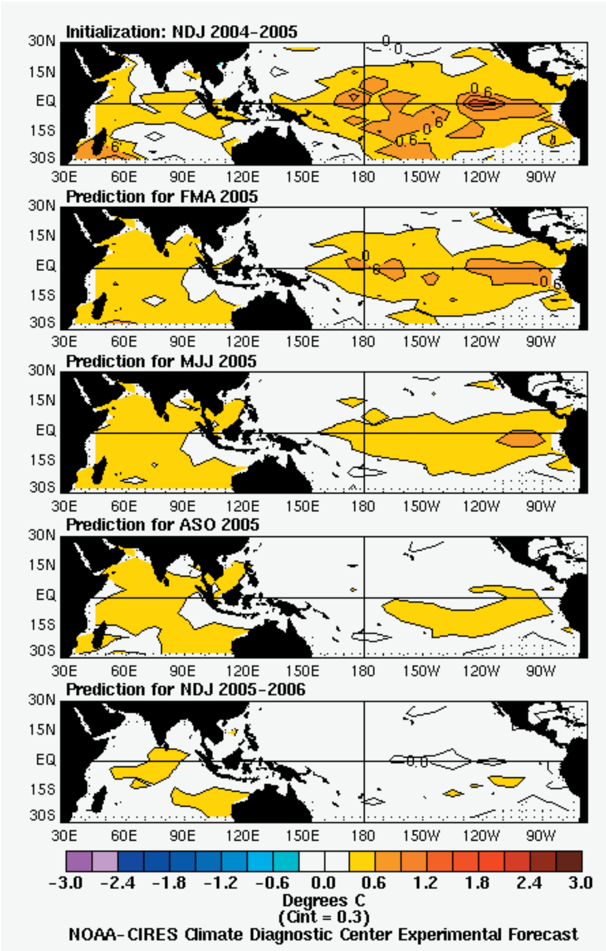
El Niño: A phenomenon in the equatorial Pacific Ocean characterized by a positive sea surface temperature departure from normal (for the 1971-2000 base period) in the Niño 3.4 region greater than or equal in magnitude to 0.5 degrees C, averaged over three consecutive months.

La Niña: A phenomenon in the equatorial Pacific Ocean characterized by a negative sea surface temperature departure from normal (for the 1971-2000 base period) in the Niño 3.4 region greater than or equal in magnitude to 0.5 degrees C, averaged over three consecutive months.

The index is defined as three-month averages of sea surface temperature departures from normal for a critical region of the equatorial Pacific (Niño 3.4 region; 120W-170W, 5N-5S). This region of the tropical Pacific contains what scientists call the “equatorial cold tongue,” a band of cool water that extends along the equator from the coast of South America to the central Pacific Ocean. Departures from average of sea surface temperatures in this region are critically important in determining major shifts in the pattern of tropical rainfall, which influence the jet streams and patterns of temperature and precipitation around the world.



The red box on this sea surface temperature (SST) anomaly graphic depicts the Niño 3.4 region.



SOUTHEAST ALASKA CLIMATE OUTLOOK

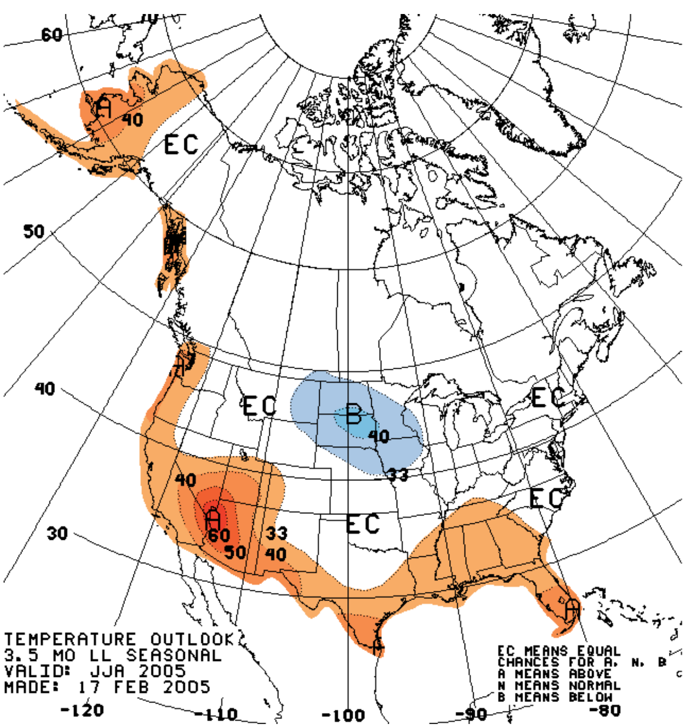
By NWS Juneau Climate Team

"Based on the recent evolution of oceanic and atmospheric conditions and a majority of the statistical and coupled model forecasts, it seems most likely that weak warm episode (El Niño) conditions will gradually weaken during the next three months and that ENSO-neutral conditions will prevail during the last half of 2005" -NOAA Climate Prediction Center

The graphic on the left is one climate model's output on whether we are heading into an El Niño, La Niña, or ENSO-neutral state in the equatorial Pacific Ocean. This graphic reveals that our weak El Niño will give way to ENSO-neutral conditions in the coming months.

The NOAA Climate Prediction Center's (CPC) most recent projections for the upcoming spring season (March through May) are calling for warmer than average temperatures and near average precipitation. At press time, there were weak indications that the Southern Panhandle might experience a slightly drier than average Spring.

The summer outlook for Southeast Alaska is calling for above average temperatures. The current forecast trend actually shows a better chance for June to be warmer than average, with a return to average temperatures by August. As for the CPC's summer precipitation outlook, they are calling for an equal chance for above average, below average, and near average precipitation. At first glance that prediction does not seem to give us much insight. However, just the fact we have only a 33% chance of being drier than average hints that we'll need to keep our umbrellas handy this summer.



The Climate Prediction Center is calling for warmer than average temperatures in Southeast Alaska for the first half of the upcoming summer.

The early projections for next winter are where things begin to get a bit more interesting. The trend of cooler ENSO-neutral conditions developing from our current weak El Niño, usually adds up to a more average winter season. Neither record cold nor snowfall is expected, but it could wind up being our snowiest winter since the 1998-99 season; perhaps even exceeding those levels! Good news for snow lovers out there, and plenty of time for the rest of us to get our snow blowers repaired.

Southeast Alaska Spring and Summer Climatology

Location	Average Driest Month	Average Spring Highs	Average Spring Lows	Average Spring Precipitation	Average Summer Highs	Average Summer Lows	Average Summer Rainfall
Juneau	April	47°F	33°F	9.82”	63°F	47°F	12.74”
Gustavus	April	47°F	32°F	8.19”	63°F	47°F	10.83”
Skagway	April	**50°F**	33°F	**4.01”**	67°F	49°F	**4.40”**
Kake	April	**50°F**	35°F	9.34”	63°F	47°F	8.49”
Hyder	May	49°F	32°F	12.81”	**68°F**	49°F	12.50”
Yakutat	June	**45°F**	**30°F**	28.39”	59°F	**46°F**	26.14”
Sitka	June	48°F	37°F	15.43”	60°F	50°F	14.27”
Petersburg	June	48°F	33°F	20.09”	62°F	47°F	18.12”
Wrangell	June	49°F	36°F	14.30”	63°F	49°F	14.22”
Angoon	June	47°F	35°F	6.58”	61°F	48°F	7.96”
Elfin Cove	June	46°F	36°F	18.17”	**58°F**	49°F	14.23”
Pelican	June	47°F	34°F	26.87”	60°F	47°F	20.98”
Hollis	June	**50°F**	34°F	18.64”	65°F	48°F	11.43”
Craig	June	**50°F**	37°F	19.57”	63°F	50°F	12.94”
Port Alexander	June	48°F	37°F	30.82”	63°F	48°F	26.87”
Ketchikan	July	**50°F**	37°F	31.39”	64°F	50°F	25.43”
Annette	July	**50°F**	**38°F**	22.61”	63°F	**51°F**	16.74”
Haines	July	49°F	34°F	6.70”	65°F	50°F	5.37”
Little Port Walter	July	47°F	35°F	**43.98”**	61°F	48°F	**30.34”**
Southeast Alaska Averages:		**48°F**	**35°F**	**18.30”**	**63°F**	**48°F**	**15.47”**

* Length of weather observation record that determined the average values varies by location.
* Spring is March 1 – May 31 and summer is June 1 – August 31.
* Max and min averages for each category are in bold type.

Road Weather Information System

By Ursula Jones

Planning a road trip for this spring or early summer? If so, there are several avenues to get your weather information. One, of course, is the National Weather Service and another is the State of Alaska, Department of Transportation program Alaska Road Weather Information System (RWIS). There are sixteen RWIS sites throughout Alaska, with six in Southeast alone. Four are located in the Juneau area which include Glacier Highway mile post 22 (Cohen Drive), Mendenhall Loop Road at the bottom of Goat Hill, Glacier Highway/Egan Drive mile post 3, and North Douglas Highway mile post 4. The other two sites in Southeast are in the Haines area located on the Haines Highway, one at the Chilkat River Bridge mile post 23.8 and the other at Klehini mile post 36.6. A seventh site, near Skagway at mile post 14.9 on the Klondike Highway, isn’t operational yet. RWIS stations may include some or all of the following:

- atmospheric sensors adjacent to the roadway to measure: air temperature, relative humidity, wind speed and direction, and precipitation
- pavement sensors in travel lanes to measure: surface temperature, chemical composition of deicing compounds, moisture, and subsurface temperatures, taken 17" below the surface
- cameras that take still images of the roadway

Since the weather data provided is in real-time, these sites are another way to be safe while enjoying Southeast Alaska’s diverse weather. For more information on the RWIS, go to their web site http://www.dot.state.ak.us/iways/roadweather/index.shtml.

Cloudburst Classroom

by Kimberly Vaughan

Precipitation - Not Just Another Drop in the Bucket

Precipitation falls in many different forms. It varies mostly by three different factors: is it liquid, freezing or frozen. It can be further described by whether it is showery or not. We are going to cover 12 types of precipitation by appearance, size, and why they occur.

Let's start with the liquid variety first. This includes drizzle, rain, and rain showers.

- Drizzle is typically a uniform type of precipitation comprised of very small, close together water droplets (less than 0.02" in diameter). Drizzle differs from mist by falling to the ground, whereas mist remains suspended in the air. Drizzle falls across a large area in a uniform manner and has also been known to hang around for days with low ceiling and visibility.
- Rain comes in two forms. The smaller form is the same size as drizzle, with the difference being rain is widely spaced. The larger variety (larger than 0.02") will produce a rain-like drizzle, usually falling uniformly over a wide area. Rain may also continue to occur for hours, sometimes days.
- Rain showers have the same characteristics as rain in terms of droplets. Unlike rain and drizzle, Rain showers may be sporadic not only in where they fall, but in the amounts that fall. Showers can also be accompanied by gusty winds. Showers stop and start frequently, moving over an area and can be triggered by orographic lift; the lift caused by the air moving up a side of mountain or hill. The steeper the topography, the stronger the lift, which may cause heavier showers. Mechanical lift is the lifting mechanism from the air itself. Without going into a physics lesson, if the land is warmer than the air above, it will heat the air making it rise. As this air rises it becomes more unstable; hence, we get showers instead of rain. Another thing that happens is that, as this warmer air rises, it is taking moisture up with it. As we've learned before, cold air cannot hold as much moisture as warmer air. The warmer air travels up and is cooled with the moisture condensing to form a cloud. The more unstable the air is, the taller the clouds. After the cloud continues to form and is finally unable to hold any more moisture, it begins to produce a shower.

Poul Jensen

Next we'll cover freezing rain and drizzle.

- Freezing rain and drizzle fall like their counterparts above, but instead of remaining in liquid form, they freeze on contact. Surfaces can become encased in a layer of glaze. Normally, temperatures will decrease with height. For freezing rain or drizzle to occur there must be freezing temperatures near the surface with an above freezing temperature layer above.

This next group contains the more unique types of precipitation, sometimes even having different varieties within one type. They are ice crystals, ice pellets, snow grains, hail, and snow pellets.

- Ice crystals are sometimes called diamond dust. This precipitation falls in the form of needles, plates, and columns. Although much like snow, there is little to no accumulation.

NWS Forecast Office Blacksburg, Virginia

❁ Ice pellets come in two types. The general description for ice pellets is a pellet of translucent ice that can be round or irregular in shape. They have a diameter of 0.2" or less and are formed either by having a thin layer of ice encasing snow or by hard grains of ice from partially melted and then refrozen snowflakes or raindrops. In rare cases, ice pellets can be conical in shape. The common name for this is sleet, which also includes snow pellets and small hail.

❁ Snow pellets and small hail are grouped together as being a grain of ice that is white and opaque. Their size ranges from 0.08" to 0.2" in diameter. Snow pellets and small hail can also be conical in shape.

❁ Hail, a rare site in Southeast Alaska, forms in an unstable column of air that forms a cloud. Inside the cloud, water droplets are thrown upward in the column until they freeze. They then become too heavy and fall back down. This process can be repeated many times. With every trip the hail gets larger as it is coated with water in the lower levels and refrozen near the top. When the hail becomes too heavy to remain in the column of air, it falls to the ground.

The last two types of precipitation are snow and snow showers. Like their liquid cousins, they have the same characteristics, only taking on a different form.

❁ Snow falls in the form of crystals. These crystals can take six different shapes: stars, needles, dendrites, columns, plates, and columns capped with plates. Different types of snow fall from different atmospheric set-ups, as we learned from the "It's Cool to be a Flake" article. The atmosphere is below freezing where the crystals are formed and fall to the surface where temperatures are usually near 32° Fahrenheit or lower. It can happen, and has this winter, where temperatures are above freezing by a fair bit, like 37° and snowing. This happens when the warm layer near the surface is very shallow and does not allow the frozen crystal to melt before reaching the ground.

❁ Snow showers come in the same varieties as their snow counterpart. The big difference is they occur in an unstable atmosphere allowing for inconsistent rates of accumulation and frequent changes in intensities. In a distance of only a few miles there can be a difference of several inches, sometimes feet, in snow fall.

The next time precipitation falls from the sky, you'll know exactly what type it is. From the gentle drizzle to the violent hail, precipitation falls in many different forms and can even change during its trip to earth.

Precipitation Trivia

1. The largest hail stone was:
   - A. 5" wide
   - B. 6" wide
   - C. 7" wide
   - D. 8" wide

2. A hail stone may contain:
   - A. Ice
   - B. Birds
   - C. Insects
   - D. All of the above

3. The heaviest hail stone was:
   - A. Half a pound
   - B. 2 pounds
   - C. 5½ pounds
   - D. 1½ pounds

4. Heaviest rainfall in one minute:
   - A. Half an inch
   - B. 1.8 inches
   - C. 2.3 inches
   - D. 3 inches

Snowflake photo taken in 1902

5. How fast can hail stones fall:
   A. over 25 mph
   B. over 50 mph
   C. over 100 mph
   D. All of the above

6. Heaviest rainfall in one calendar month:
   A. 366"
   B. 187"
   C. 207"
   D. 54"

7. If there are liquid droplets falling from the sky that frequently change intensity and stop and start often, this is what type of precipitation:
   A. Drizzle
   B. Hail
   C. Rain showers
   D. Ice crystals

8. What type of cloud produces hail:
   A. Cumulus humulus
   B. Standing lenticulars
   C. Cirrocumulus
   D. Cumulonimbus

9. Virga is the name for:
   A. Full rainbows
   B. Rain that falls from a cloud, but does not reach the ground
   C. Intermittent drizzle
   D. Ring or halo that forms around the sun

10. True or False: Gusty winds most frequently occur with drizzle.

Answers

1. D. 7 inches. Fell on June 22, 2003 in Aurora, Nebraska.

2. D. All of the above. Hail stones are primarily made of ice and have also been know to contain leaves, pebbles, twigs, insects, and nuts.

3. D. 1½ lbs. fell in Potter, Nebraska on July 6, 1928.

4. B. 1.8 inches fell during one minute in Basse Terra, Guadeloupe on November 26, 1970.

5. D. All of the above. Hailstone can fall at over 100 mph.

6. A. 366 inches fell in July, 1861 in Cherrapunji, Meghalaya, India. They also hold the record for the most rainfall in 12 months. From August 1860 – July 1861 1,041 inches was collected.

7. C. Showers are intermittent by nature.

8. D. Cumulonimbus. The clouds can reach heights of over 55,000 feet and can form awesome looking anvil tops.

9. B. Virga is precipitation that falls from the sky but evaporates before it reaches the ground.

10. False. Gusty winds usually occur with showers, hail, and ice pellets - the unstable types of precipitation.

Jamestown, North Dakota March 9, 1966

Photo credit: Collection of Dr. Herbert Kroehl, NGDC

Lightning Weather Trivia

Norman, Oklahoma 1978

1. How hot is lightning?
   a. 100,000°F b. 900,000°F c. 1,000°F d. 50,000°F

2. Where is the "Lightning Capital" of the U.S.?
   a. Washington b. Iowa c. Virginia d. Florida

3. A fear of lightning and thunder is called what?
   a. astraphobia b. auroraphobia c. epistemophobia d. heliophobia

4. What is the average number of lightning strikes world wide per second?
   a. 25 b. 100 c. 75 d. 50

5. How often is the Empire State Building struck by lightning per year?
   a. about 50 b. about 600 c. about 100 d. about 800

6. Can lightning strike the same place twice? a. yes b. no

WEATHER WATCHERS
SOUTHEAST ALASKA SPOTTER NETWORK
Our Most Valuable Spotter!

Cooperative Station, Granger, Utah -1930 Circa

Snowstorms! Wind! Freezing drizzle! Many of you have conveyed invaluable information to us over the past three months. As always, it was a tough choice, but ***Patty Kermoian*** located near Haines, and the ***Float School*** located near Deer Island are our Most Valuable Spotters. Both conveyed numerous timely reports over the past few months. For their efforts they will be receiving the 2005 edition of the Alaska Weather Calendar. Congratulations and thanks for the great reports!

DON'T FORGET TO SEND IN PHOTOS OF SOUTHEAST ALASKA WEATHER. IMAGES CAN BE E-MAILED TO URSULA.JONES@NOAA.GOV (IMAGE FILE SIZE MUST BE LESS THAN 5MB), OR MAILED TO US. WE WILL RETURN YOUR PHOTO AFTER IT IS SCANNED. ANY AND ALL CONTRIBUTIONS ARE APPRECIATED!

Trivia Answers: 1. d. 50,000°F, 5 times hotter than the sun! 2. d. Florida In Florida, Lightning strikes the ground about one out of every four days in a year. On average, over 50 people are struck by lightning annually, most requiring hospitalization with injuries on about 10 people result in death. 3. a. astraphobia Other synonyms include astrapophobia, brontophobia, keraunophobia, ceraunophobia, & tonitrophobia 4. b. 100 The average number of lightning strikes worldwide per day is 8.6 million and the average number in the U.S. per year is 20 million. 5. c. about 100 The building is designed to serve as a lightning rod for the surrounding area. 6. a. yes! Many tall buildings are struck by lightning several times a year and sometimes even in the same storm.

This quarterly educational newsletter is designed for Southeast Alaska's volunteer weather spotters, schools, emergency manager, and the news media. All of our customers and partners in Southeast Alaska are welcome to subscribe to it.

NOAA's National Weather Service forecast office in Juneau, Alaska is responsible for weather forecasts and warnings from Cape Suckling to the Dixon Entrance.

This publication, as well as, all of our forecasts and warnings, are available on our web site: http://pajk.arh.noaa.gov. Our newsletter is available in color on our site.

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